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EXAMINER	
BARTLEY, KENNETH	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/584,826	REDMAYNE, JOHN MICHAEL	
	Examiner	Art Unit	
	KENNETH L. BARTLEY	3693	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *See Continuation Sheet* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *See Continuation Sheet* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/02/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims pending in the application are 165-170,183-224,237-278,291-327,331,332,336,337,341,342,346,347,351,352,356,357,361,362,366,367 and 371.

Continuation of Disposition of Claims: Claims rejected are 165-170,183-224,237-278,291-327,331,332,336,337,341,342,346,347,351,352,356,357,361,362,366,367 and 371.

DETAILED ACTION

1. Claims 165-170, 183-224, 237-278, 291-327, 331-332, 336-337, 341-342, 346-347, 351-352, 356-357, 361-362, 366-367, and 371 have been examined.

Election/Restrictions

2. Applicant's election without traverse of Invention I in the reply filed on March 15, 2010 is acknowledged. Separately, the index of claims has been fixed to include all 371 claims.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

4. The disclosure is objected to because of the following informalities: para. [0030] of Pub. No. US 2009/0106133 identifies the risk pricing unit as 14 where it should be 13 (see Fig. 5).

Appropriate correction is required.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 165-170, 183-214, 215-216, 217-218, 327, 331, 342, 346, 357, and 361 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

According to the recent Guidelines issued by the Deputy Commissioner, in order for a method claim to qualify as a patent eligible process under 35 USC § 101, the process of the method claim must (1) be tied to another statutory class (such as a particular apparatus) or (2) transform underlying subject matter (such an article or materials) to a different state or thing.

In the instant case, none of the process steps of the method claims 165 and 209 are tied to an apparatus such as a computer. Accordingly, the claimed invention fails to qualify as a statutory process under the Guidelines.

The applicant is requested to indicate where in the specification there is support for the amended claim.

Note: merely reciting a computer in the preamble does not meet the aforementioned requirement nor reciting a nominal process such as communicating data with a computer. See also, In Re Bilski (2008, 545 F3d 943).

Claims 166-170, 183-208, 210-214, 215-216, 217-218, 327, 331, 342, 346, 357, and 361 are rejected because they depend from their respective independent claim.

7. Claims 273-278, 291-322, 323-326, 337, 341, 352, 356, 367, and 371 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Product claim 273, for example, has in the preamble "A computer-readable medium having computer-executable instructions..." Applying the broadest reasonable interpretation to the claim, the instructions are not required to be stored in a non-transitory manner on the medium, resulting in claims directed at transitory signals. (MPEP 2106.01 I). Claim 317 has the same problem.

Claims 274-278, 291-316, 318-322, 323-326, 337, 341, 352, 356, 367, and 371 are rejected because they depend from their respective independent claim.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 165-170, 183-224, 237-278, 291-327, 331-332, 336-337, 341-342, 346-347, 351-352, 356-357, 361-362, 366-367, and 371 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Claim 165 recites the limitation "the rate of return" in the preamble. There is insufficient antecedent basis for this limitation in the claim. Claims 219 and 273 have the same problem.

11. Claim 165 recites "the risk attributes" in the preamble. There is insufficient antecedent basis for this limitation in the claim. Claims 219 and 273 have the same problem.

12. Claim 165 recites "the volatility of returns" in step 2. There is insufficient antecedent basis for this limitation in the claim. Claims 219 and 273 have the same problem.

13. Claim 165 recites "the price per unit" in step 2. There is insufficient antecedent basis for this limitation in the claim. Claims 219 and 273 have the same problem.

14. Claim 165, step 1 has "...the rate of return for each security" where there is no prior step of calculating a rate of return for each security. Claims 219 and 273 have the same problem.

15. Claim 165, step 1 has "determining a risk premium incorporated in the rate of return..." where it is indefinite as to what determining a risk premium means if there is already a risk premium in the rate of return. This is interpreted to mean determining a risk premium rate for each of the plurality of securities, wherein said risk premium rate is part of the calculated rate of return for each of the plurality of securities. Claims 219 and 273 have the same problem.

16. Claim 165, step 2 has "designating that a price risk factor incorporated in the risk premium...is the volatility of returns" where it is indefinite as to how a price risk factor is

designated if the price risk factor has first not been determined. A prior step of determining a price risk factor is required. Claims 219 and 273 have the same problem.

17. Claim 165, step 2 has "designating that a price risk factor incorporated in the risk premium…is the volatility of returns…" where it is indefinite as to how designating occurs if volatility of returns is incorporated in the price risk factor. This step is interpreted to mean designating a volatility of returns based on the determined price risk factor for each of the plurality of securities, wherein the volatility of returns is part of the price risk factor... Claims 219 and 273 have the same problem.

18. Claim 165, step 2 has "designating…is the volatility of returns, measured over discrete time, and that the price per unit of this risk factor is the same for two or more of the said securities;..." where measured over discrete time is indefinite based on the function of designating. This is interpreted to mean that when determining a rate of return, the rate of return is over a discrete time period. Claims 219 and 273 have the same problem.

19. Claim 165, step 2 has "…the price per unit of this risk factor ..." where it is indefinite as to what "price per unit" refers to (e.g. price/share). Also, it is indefinite as to how rate of return (factor or percent) relates to risk factor, if the risk factor is a price per unit. Rate of return is based on discounting net cash flows over time. How does a "price risk factor" with a price per unit relate to a risk premium and a rate of return, where rate of return is discounted net cash flow over initial investment? Claims 219 and 273 have the same problem.

20. Claim 165, step 3 has "defining a model comprising data..." where it is indefinite as to how data is a model. Claims 219 and 273 have the same problem.

21. Claim 165, step 3 has "...a model comprising data representing relationships..." where it is indefinite as to how data represents relationships. Claims 219 and 273 have the same problem.

22. Claim 165, step 3 has "...relationships between the risk premiums..." where relationships is indefinite since this could be anything. This is interpreted to mean the risk premiums are different for each security. Claims 219 and 273 have the same problem.

23. Claims 209 and 317 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: 1) risk parameters are generated from the model, but no model has first been created; 2) the risk parameters have been "estimated over a discrete time period" but no step of estimating the risk parameters over a time period is provided; 3) solving the model based on values specified by a user where the user has not yet provided values.

24. Claims 209, 273, and 317 are computer readable media having where a computer or processor is required to carry out the computer instructions.

25. Claims 219 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: Claim 219 is a

system claim with memory, a user interface, and units. There is no bus to connect the units together or to a network.

26. Claims 263 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: Claim 263 is a system claim with memory and a processing unit, where a user specifies values, but there is no user interface, no network, no bus. Further, it is indefinite as to what processing units are involved (see Fig. 5).

27. Claim 263 is indefinite as to how generate risk parameters from a model where the model has not been created (could be anything). Risk parameters over an estimated time period is indefinite since the risk parameters are generated from a model, therefore the parameters would have to be determined for a time period unless the model provides specific time periods of already estimated parameters. It is indefinite as to how the model is solved to the parameters equal values specified by users.

28. Claim 169 recites the limitation "the expected default loss" in the preamble. There is insufficient antecedent basis for this limitation in the claim. Claims 223 and 277 have the same problem.

29. Claim 169 recites the limitation "of another, debt-type security)" in the preamble. There is insufficient antecedent basis for this limitation in the claim. There is no debt-

type security from which another relates to. Claims 223 and 277 have the same problem.

30. Claim 169 recites the limitation "the promised yield" the first step. There is insufficient antecedent basis for this limitation in the claim. Claims 223 and 277 have the same problem.

31. Claim 169 recites the limitation "the excess return" in the calculating the excess return step. There is insufficient antecedent basis for this limitation in the claim. Claims 223 and 277 have the same problem.

32. Claim 169 recites the limitation "the risk free rate of return" in the calculating the excess return step. There is insufficient antecedent basis for this limitation in the claim. Claims 223 and 277 have the same problem.

33. Claim 169 recites the limitation "the exposure of each security" in the calculating the exposure step. There is insufficient antecedent basis for this limitation in the claim. Claims 223 and 277 have the same problem.

34. Claim 169 recites the limitation "the product of the risk exposures" in the calculating a price per unit step. There is insufficient antecedent basis for this limitation in the claim. Claims 223 and 277 have the same problem.

35. Claim 169 recites the limitation "calculating the excess rate of return" in the calculating the excess return step. There is insufficient antecedent basis for this limitation in the claim. Claims 223 and 277 have the same problem.

36. Claim 169 recites the limitation "the other securities being analysed" in the calculating the excess rate of return step. There is insufficient antecedent basis for this limitation in the claim. Claims 223 and 277 have the same problem.

37. Claim 169 has "parameters of interest" in the providing step where parameters of interest are indefinite as there is no limitation as to where the parameters of interest come from or how they are determined. Claims 223 and 277 have the same problem.

38. Claim 170 recites the limitation "the relationship between the firm specific price" in the first step. There is insufficient antecedent basis for this limitation in the claim. Claims 224 and 278 have the same problem.

39. Claim 170 recites the limitation "the rate of return (rk) on another class" in the second step. There is insufficient antecedent basis for this limitation in the claim. Claims 224 and 278 have the same problem.

40. Claim 170 recites the limitation "the default loss on said securities" in the third step. There is insufficient antecedent basis for this limitation in the claim. Claims 224 and 278 have the same problem.

41. Claim 183 recites the limitation "the real world distribution" in the first step. There is insufficient antecedent basis for this limitation in the claim. Claims 237 and 291 have the same problem.

42. Claim 183 recites the limitation "the returns on the underlying asset" in the first step. There is insufficient antecedent basis for this limitation in the claim. Claims 237 and 291 have the same problem.

43. Claim 183 recites the limitation "the real world probability" in the first step. There is insufficient antecedent basis for this limitation in the claim. Claims 237 and 291 have the same problem.

44. Claim 183 recites the limitation "the expected mean, standard deviation…" in the third step. There is insufficient antecedent basis for this limitation in the claim. Claims 237 and 291 have the same problem.

45. Claim 183 recites the limitation "the aforesaid parameters…the real world pay off" in the forth step. There is insufficient antecedent basis for this limitation in the claim. Claims 237 and 291 have the same problem.

46. Claim 183 recites the limitation "the aforesaid parameters" where it is indefinite as to what parameters are required to calculate. Claims 237 and 291 have the same problem.

47. Claim 183 recites the limitation "the expected option pay off" in the fifth step. There is insufficient antecedent basis for this limitation in the claim. Claims 237 and 291 have the same problem.

48. Claim 183 recites the limitation "moments of higher interest to the user… for any other factors specified by a user…" where it is indefinite as to why the user is not specifying other factors. Claims 237 and 291 have the same problem.

49. Claim 183 has "parameters of interest" in the providing step where parameters of interest are indefinite as there is no limitation as to where the parameters of interest come from or how they are determined. Claims 237 and 291 have the same problem.

50. Claim 204 recites the limitation "the portions of that distribution." There is insufficient antecedent basis for this limitation in the claim. Claims 258 and 312 have the same problem.

51. Claim 206 recites the limitation "the returns on the firm..." There is insufficient antecedent basis for this limitation in the claim. Claim 314 has the same problem.

52. Claim 185 has "parameters of interest" in the providing step where parameters of interest are indefinite as there is no limitation as to where the parameters of interest come from or how they are determined. Claims 239 and 293 have the same problem.

53. Claim 186 has the following antecedence problems: "the real world distribution process"; the expected real world probability:; "the mean, standard deviation..."; "the distribution process"; "the time horizon of interest"; the aforesaid parameters"; "the real world pay off"; "the chosen evaluation date"; "the price per unit of risk..." Claims 240 and 294 have similar problems.

54. Claim 186 has "parameters of interest" in the providing step where parameters of interest are indefinite as there is no limitation as to where the parameters of interest come from or how they are determined. Claims 240 and 294 have the same problem.

55. Claim 187 recites the limitations: "additional multi-variate equations..."; "... the variables..." in the first step. There is insufficient antecedent basis for this limitation in the claim. Claims 241 and 295 have the same problem.

56. Claim 187 recites the limitations: "the remaining unknown variables..."; "...in the equations" in the second step. There is insufficient antecedent basis for this limitation in the claim. Claims 241 and 295 have the same problem.

57. Claim 188 recites the limitation: "the unknown inputs…". There is insufficient antecedent basis for this limitation in the claim. Claims 189-195, 242-249, and 296-303 have the same problem.

58. Claim 191 recites the limitation: "the correlation between…". There is insufficient antecedent basis for this limitation in the claim. Claims 245 and 299 have the same problem.

59. Claim 190 recites the limitation: "the covariance between the returns…". There is insufficient antecedent basis for this limitation in the claim. Claims 192, 244, 246, 298, and 300 have the same problem.

60. Claim 193 recites the limitation: "the expected probability of default." There is insufficient antecedent basis for this limitation in the claim. Claims 201, 247, 255, 301, and 309 have the same problem.

61. Claim 195 recites the limitation: "the expected default loss..." There is insufficient antecedent basis for this limitation in the claim. Claims 249 and 303 have the same problem.

62. Claim 197 recites the limitation: "the correlation between the returns..." There is insufficient antecedent basis for this limitation in the claim. Claims 199, 251, 253, 305, and 273 have the same problem.

63. Claim 198 recites the limitation: "the covariance between the returns..." There is insufficient antecedent basis for this limitation in the claim. Claims 200, 252, 254, and 306-307 have the same problem.

64. Claim 202 recites the limitation: "the expected loss given default" There is insufficient antecedent basis for this limitation in the claim. Claims 256 and 310 have the same problem.

65. Claim 203 recites the limitation: "the expected default loss..." There is insufficient antecedent basis for this limitation in the claim. Claims 257 and 311 have the same problem.

66. Claim 205 recites the limitation: "the portions of that distributio..." There is insufficient antecedent basis for this limitation in the claim. Claims 259 and 313 have the same problem.

67. Claim 207 recites the limitation: "the real world statistical distribution process..." There is insufficient antecedent basis for this limitation in the claim. Claims 261 and 315 have the same problem.

68. Claim 208 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: there is no receiving step providing values for the parameters listed in the equation; there is no calculating step that determines values for the two equations. Further, if this is a transcendental equation, it is indefinite as to how the equation is solved (i.e. is an iterative process required). Claims 262 and 316 have the same problem.

69. Claim 208 recites various parameters. For example: Sn is the value of the equity of the firm at time n. There is no antecedent basis for the value of the equity at time n.

Other parameters listed have similar problems. Claims 262 and 316 have the same problem.

70. Claim 210 recites the limitation: "the returns..." and "the securities..." There is insufficient antecedent basis for this limitation in the claim. Claims 264 and 318 have the same problem.

71. Claim 211 recites the limitation: "the correlation..." and "between the returns..." There is insufficient antecedent basis for this limitation in the claim. Claims 213, 265, 267, 319 and 321 have the same problem.

72. Claim 212 recites the limitation: "the covariance..." and "between the returns..." There is insufficient antecedent basis for this limitation in the claim. Claims 214, 266, 368, 320, and 322 have the same problem.

73. Claim 213 recites the limitation: "the returns of the total firm" There is insufficient antecedent basis for this limitation in the claim. Claims 214, 267-268 and 321-322 have the same problem.

74. Claim 215 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: there is no receiving step providing values for the parameters listed in the equation; there is no calculating step that determines values for the two equations; there is no defining of the variables in the claim. Claims 215, 269-270, and 323-324 have the same problem.

75. Claim 215 recites the limitation: "the formula..." There is insufficient antecedent basis for this limitation in the claim. Claims 216-218, 269-272 and 323-326 have the same problem.

76. Claim 215 recites "...formula for calculating additional parameters...for calibration with the model comprise:..." two formulas are listed. There are two formulas (not formula), and it is indefinite as to how calibration is accomplished with the two formulas. Claims 216, 269-270 and 323-324 have the same problem.

77. Claim 217 recites "...formula for calculating additional parameters...for calibration with the model comprise:..." where multiple formulas are listed. It is indefinite as to how calibration is accomplished with the formulas. Claims 218, 271-272, and 325-326 have the same problem.

78. Claim 217 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: there is no receiving step providing values for the parameters listed in the equation; there is no calculating step that determines values for the equations; there is no defining of the variables in the claim. Claims 218, 271-272, and 325-326 have the same problem.

79. Claim 308 recites the limitation: "the covariance between the returns..." There is insufficient antecedent basis for this limitation in the claim.

80. Claims 331 and 336 are hybrid claims. Hybrid claims occur when two different statutory categories are claimed. For example, claim 331 is directed at a product, but is

part of a method claim. Claims 327, 332, 342, 346-347, 351, 357, 361-362, and 366 have a similar problem.

Claims 166-170, 183-208, 210-218, 220-224, 237-262, 264-272, 274-278, 291-316, 318-327, 331-332, 336-337, 341-342, 346-347, 351-352, 356-357, 361-362, 366-367, and 371 are also rejected because they depend from their respective independent claim.

Claim Rejections - 35 USC § 103

81. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

82. Claims 165-168, 185, 187-189, 191, 195-197, 199, 202-203, 209-222, 239, 241-243, 245, 249-251, 253, 256-257, 263-276, 293, 295-297, 299, 303-305, 307, 310-311,

317-327, 331-332, 336-337, 341-342, 346-347, 351-352, 356-357, 361-362, 366-367,

and 371 rejected under 35 U.S.C. 103(a) as being unpatentable over Patent No. US

5,812,988 to Sandretto in view of Patent No. US 6,546,375 to Pang et al.

Regarding claims 165, 219 and 273:
(claim 165) A computer implemented method for relating a price or value of a plurality of securities associated with an underlying asset, the rate of return on said securities and the risk attributes of said securities, the method comprising the steps of:
determining a risk premium incorporated in the rate of return for each security;

Sandretto teaches:
"(4) determine an initial input risk measure for each asset based on a risk-return type asset pricing model; (5) determine an initial discount rate for each asset using the initial input risk measure for each asset and using different economic variables that relate to each set of cash flows (for example, the risk-free rate and the market risk premium which are typically different for each set of cash flows); (col. 8, line 67 and col. 9, lines 1-7) Therefore a market risk premium is part of an input risk measure.

designating that a priced risk factor incorporated in the risk premium for each security is the volatility of returns, measured over discrete time, and that the price per unit of this risk factor is the same for two or more of the said securities; and

Sandretto teaches col. 4, lines 20-35:

$$(1)\ E(\tilde{R}_i)=R_f+\beta_i[E(\tilde{R}_m)-R_f]$$

for i=1 . . . N, where n is an integer equal to the number of assets, and

where:

$E(\tilde{R}_i)$=the expected value of the return from investing in asset i

R_f=the return from investing in a risk-free asset (typically 30-day U.S. Treasury bills)

β_i=the risk measure for firm i

$E(\tilde{R}_m)$=the expected value of the return from investing in the market (typically the expected return to investing in some market index, such as the New York Stock Exchange [NYSE] Index™, or the S&P 500 Index)

The risk factor β is for the same firm i.

(2) $R_{it}=R_{ft}+\beta_i*(R_{mt}-R_{ft})$

where:

R_{it}=the actual return from investing in asset i during a prior period t

R_{mt}=the actual return from investing in the market portfolio during a prior period t

R_{ft}=the actual risk-free rate during a prior period t

β_i=the slope coefficient derived by regressing R_{it} against R_{mt}

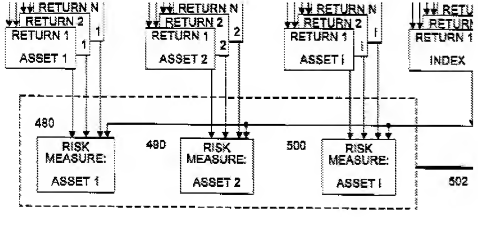
Therefore, risk over time is determined.

"Using the statistical process of ordinary least squares regression, regress the returns for GM stock against the returns for the market index. The resulting regression yields a risk measure for General Motors stock. That risk measure, the slope of the regression line, is usually called beta (.beta.). The estimated .beta." (col. 5, liness 9-14) Beta is the volatility of the return.

See Volatility below.

defining a model comprising data representing relationships between the risk premiums determined for each security.

Fig. 3 teaches risk measures and returns for different assets:



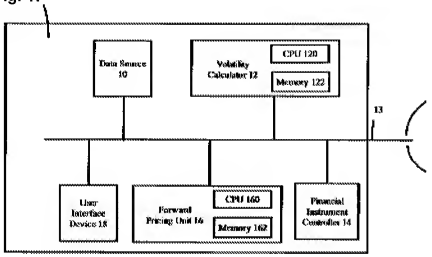
"(4) a risk premium or premiums for one or more asset classes based on the risk premium or premiums for one or more other asset classes;" (col. 3, lines 33-35)

Volatility

Sandretto teaches beta, he does not teach "volatility."

Pang et al. teaches:
"In a preferred embodiment, financial engine 100 is composed of a plurality of modules: data source 10, implied volatility calculator 12, financial instrument controller 14, forward pricing unit 16, and user interface device 18."

Fig. 1:



It would have been obvious to one of ordinary skill in the art at the time of invention to use volatility as taught by Pang et al. since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

Regarding claims 166, 220, and 274:
(claim 166) The computer implemented method of claim 165, wherein at least one of said plurality of securities is a debt-type instrument, and further comprising analysing a yield spread associated with the debt-type instrument and identifying a default loss component and a risk premium component of said yield spread.

Sandretto teaches:
"5) a default premium for one or more specific debt issues;" (col. 3, lines 34-37) Inherent with risk premium is yield spread, where spread consists of the premium.

Regarding claims 167, 221 and 275:
(clam 167) The computer implemented method of claim 165, further comprising fitting the model.

Sandretto teaches:

"More specifically, this invention relates to an iterative process to estimate a discount rate for each of two or more assets. This invention relates to similar iterative processes to estimate other variables or coefficients that are useful in estimating an asset's risk or NPV." (col. 3, lines 23-29) Therefore an iterative process solves (fits) the variables to the equations.

Regarding claims 168, 222 and 276:
(claim 168) The computer implemented method of claim 167, further comprising providing as output to a user parameters of the fitted model.

Sandretto teaches:

"FIG. 3 is a schematic drawing of how different estimates for economic variables are used to estimate projected cash flows for each asset, how those cash flows are used to determine NPVs for each asset and for an index, how NPVs are used to determine simulated returns, how simulated returns are used to determine output risk measures, and how the iterative process is used to re-estimate NPVs and asset values;" (col. 13, lines 1-8)

Regarding claims 185, 239, and 293:
(claim 185) The computer implemented method of claim 165, wherein a user applies an option-theoretic model of the firm, the method further comprising the steps of: determining a plurality of input parameters, the parameters including a risk premium in the rate of return for each security issued by, or referenced to, the firm;

Sandretto teaches:

"However, unlike the iterative process for asset risk measures and for the risk premium, this difference cannot be reduced to an arbitrarily small amount, only to a minimum value that depends upon various input parameters and market prices for individual assets. Typically, but not in all cases, selecting a new .beta. that is between the input .beta. and the output .beta. will assure that the process will converge, as desired." (col. 18, lines 2-8)

defining relationships between said parameters;

"For example, the risk-free rate may be expected to fluctuate or vary somewhat randomly over time, but more significant changes over time may be dependent on another variable, such as inflation. Such a model may be defined as the distribution of each economic variable, or alternatively, in combination with a relationship between one or more of the economic variables used in the process." (col. 19, lines 37-40)

fitting the model; and

"More specifically, this invention relates to an iterative process to estimate a discount rate for each of two or more assets. This invention relates to similar iterative processes to estimate other variables or coefficients that

are useful in estimating an asset's risk or NPV." (col. 3, lines 23-29) Therefore an iterative process solves (fits) the variables to the equations.

providing as output to a user parameters of interest from the fitted model.

"FIG. 3 is a schematic drawing of how different estimates for economic variables are used to estimate projected cash flows for each asset, how those cash flows are used to determine NPVs for each asset and for an index, how NPVs are used to determine simulated returns, how simulated returns are used to determine output risk measures, and how the iterative process is used to re-estimate NPVs and asset values;" (col. 13, lines 1-8)

Regarding claims 187, 241 and 295:

(claim 187) The computer implemented method of claim 185, further comprising the steps of:

defining additional multi-variate equations representing relationships between some or all of the variables used in the model of claim 185; and

Sandretto teaches:

"Thus the asset models 20, which may be comprised of look-up tables for the data elements or other data structures (meaning herein physical relationships among the stored data elements) stored in RAM 4 and/or data storage device 8. These data structures together with associated program instructions, specify and/or prompt the user to input information required in Step 10." (col. 16, lines 56-63)

solving all of the multi-variate equations and the said model to calculate the remaining unknown variables in the equations and the model.

"Economic information, such as the risk-free rate and the current rate of inflation, is entered in the same interactive manner in Step 30. According to a preferred embodiment of the invention, the particular economic information input in Step 30 is specified with reference to one of several predetermined economic models 40 which may be comprised of look-up tables or similar physical data structures. In Step 50, several sets of cash flows are determined for a specified number of periods, such as each of the next twenty quarters, for each asset under various economic conditions. The cash flows determined in Step 50 are preferably determined with reference to one of several predetermined asset cash flow models 60." (col. 16, lines 67 and col. 17, lines 1-12)

Regarding claims 188, 242 and 296:

(claim 188) The computer implemented method of claim 187, wherein at least one of the unknown inputs included in one or more additional multi-variate equations comprises or

represents a statistical moment of one of the securities issued by, or referenced to the firm.

Sandretto teaches:

"In Step 560 the user enters into computer system 1 the current estimate for each economic variable (i.e., the mean), the statistical distribution (assuming that the revised sets of economic variables are to be randomly generated using statistical methods), and any correlations between variables." (col. 25, lines 63-67, and col. 26, line 1)

Regarding claims: 189, 243, 297; and claims 191, 245 and 299:

(claim 189) The computer implemented method of claim 187, wherein at least one of the unknown inputs included in one or more additional multi-variate equations comprises or represents the correlation between the returns of a pair of securities issued by, or referenced to, the firm.

(claim 191) The computer implemented method of claim 187, wherein at least one of the unknown inputs included in one or more additional multi-variate equations comprises or represents the correlation between the returns of a security issued by, or referenced to, the firm and the returns of the total firm.

Sandretto teaches:

"In Step 560 the user enters into computer system 1 the current estimate for each economic variable (i.e., the mean), the statistical distribution (assuming that the revised sets of economic variables are to be randomly generated using statistical methods), and any correlations between variables." (col. 25, lines 63-67, and col. 26, line 1)

"In Step 600 the user enters the number of debt instruments, or bonds, to be evaluated." (col. 26, lines 25-26)

Regarding claims: 195, 249 and 303

(claim 195) The computer implemented method of claim 187, wherein at least one of the unknown inputs included in one or more additional multi-variate equations comprises or represents the expected default loss on a debt-type security issued by, or referenced to, the firm.

Sandretto teaches:

"(4) equate the default risk premium for corporate debt with the default risk premium as implied by the likelihood of default under various economic outcomes;" (col. 12, lines 41-44)

Regarding claims 196, 250 and 304:

(claim 196) The computer implemented method of claim 185, further comprising the steps of generating one or more parameters from the model and solving the model so that the said parameters equal values specified by a user, where one of the said parameters is a statistical moment of the returns of one of the securities issued by, or referenced to, the firm.

Sandretto teaches:
"In Step 560 the user enters into computer system 1 the current estimate for each economic variable (i.e., the mean), the statistical distribution (assuming that the revised sets of economic variables are to be randomly generated using statistical methods), and any correlations between variables." (col. 25, lines 63-67, and col. 26, line 1)

"(4) equate the default risk premium for corporate debt with the default risk premium as implied by the likelihood of default under various economic outcomes;" (col. 12, lines 41-44)

Regarding claims 197, 251 and 305:
(claim 197) The computer implemented method of claim 185, further comprising the steps of generating one or more parameters from the model and solving the model so that the said parameters equal values specified by a user, where one of the said parameters is the correlation between the returns of a pair of securities issued by, or referenced to, the firm.

Sandretto teaches:
"In Step 560 the user enters into computer system 1 the current estimate for each economic variable (i.e., the mean), the statistical distribution (assuming that the revised sets of economic variables are to be randomly generated using statistical methods), and any correlations between variables." (col. 25, lines 63-67, and col. 26, line 1)

"In Step 600 the user enters the number of debt instruments, or bonds, to be evaluated." (col. 26, lines 25-26)

Regarding claims 199, 253, 273, and 307:
(claim 199) The computer implemented method of claim 185, further comprising the steps of generating one or more parameters from the model and solving the model so that the said parameters equal values specified by a user, where one of the said parameters is the correlation between the returns of a security issued by, or referenced to, the firm and the returns of the total firm.

Sandretto teaches:
"The present invention relates to computer implemented processes for estimating simulated returns, asset values and risk measures using estimated financial variables pertaining to an asset, such as economic variables and asset-specific characteristics." (col. 1, lines 11-15)

Regarding claims: 202, 256, 310; and claims 203, 257 and 311:
(claim 202) The computer implemented method of claim 185, further comprising the steps of generating one or more parameters from the model and solving the model so that the said parameters equal values specified by a user, where one of the said

parameters is the expected loss given default on a debt-type security issued by, or referenced to, the firm.
(claim 203) The computer implemented method of claim 185, further comprising the steps of generating one or more parameters from the model and solving the model so that the said parameters equal values specified by a user, where one of the said parameters is the expected default loss on a debt-type security issued by, or referenced to, the firm.

Sandretto teaches:

"(4) equate the default risk premium for corporate debt with the default risk premium as implied by the likelihood of default under various economic outcomes;" (col. 12, lines 41-44)

Regarding claims: 209, 263, 317:
(claim 209) A computer implemented method for applying an option-theoretic model of a firm comprising the steps of generating one or more risk parameters from the model, estimated over a discrete time period, and solving the model so that the said parameters equal values specified by a user.

Sandretto teaches:

"If in Step 162 the measure of the difference between the value of each of the bonds and their market value is less than a predetermined amount, the process continues at Step 170 where the risk measure determined by the process may be printed or otherwise displayed to the user, with other useful information including asset prices, estimated inflation, estimated risk premiums, estimated standard deviations for each bond (which may be useful for evaluating options) and, if desired, over and under valued assets." (col. 18, lines 41-49)

Regarding claims 210, 264 and 318:
(claim 210) The computer implemented method of claim 209, wherein one of the said risk parameters is a statistical moment of the returns of one or more of the securities issued by, or referenced to, the firm.

Sandretto teaches:

"If in Step 162 the measure of the difference between the value of each of the bonds and their market value is less than a predetermined amount, the process continues at Step 170 where the risk measure determined by the process may be printed or otherwise displayed to the user, with other useful information including asset prices, estimated inflation, estimated risk premiums, estimated standard deviations for each bond (which may be useful for evaluating options) and, if desired, over and under valued assets." (col. 18, lines 41-49)

Regarding claims 211, 265 and 319:

(claim 211) The computer implemented method of claim 209, wherein one of the said risk parameters is the correlation between the returns of a pair of securities issued by, or referenced to, the firm.

Sandretto teaches:

"In Step 560 the user enters into computer system 1 the current estimate for each economic variable (i.e., the mean), the statistical distribution (assuming that the revised sets of economic variables are to be randomly generated using statistical methods), and any correlations between variables." (col. 25, lines 63-67, and col. 26, line 1)

"In Step 600 the user enters the number of debt instruments, or bonds, to be evaluated." (col. 26, lines 25-26)

Regarding claims 213, 267 and 321:

(claim 213) The computer implemented method of claim 209, wherein one of the said risk parameters is the correlation between the returns of a security issued by, or referenced to, the firm and the returns of the total firm.

Sandretto teaches:

"The present invention relates to computer implemented processes for estimating simulated returns, asset values and risk measures using estimated financial variables pertaining to an asset, such as economic variables and asset-specific characteristics." (col. 1, lines 9-15)

Regarding claims 215, 269 and 323:

(Claim 215) The computer implemented method of claim 185, wherein the formula for calculating additional parameters, being instantaneous volatility, for calibration with the model comprise:

$$\sigma_E = \sigma_V \frac{V_0}{B_0} e^{(r_V - r_B)t} \left[1 - N(d_1)\right]$$

$$\sigma_S = \sigma_V \frac{V_0}{S_0} e^{(r_V - r_S)t} N(d_1)$$

No Patentable Weight is given to non-functional descriptive material. There are no functional steps provided, only two equations. See MPEP 2106.01 II.

Regarding claims 216, 270 and 324:

(claim 216) The computer implemented method of claim 209, wherein the formula for calculating additional parameters, being instantaneous volatility, for calibration with the model comprise:

$$\sigma_B = \sigma_V \frac{V_0}{B_0} e^{(r_V - r_B)T} N(d_1)$$

$$\sigma_S = \sigma_V \frac{V_0}{S_0} e^{(r_V - r_S)T} N(d_2)$$

No Patentable Weight is given to non-functional descriptive material. There are no functional steps provided, only two equations. See MPEP 2106.01 II.

Regarding claims 217, 271 and 325:
(claim 217) The computer implemented method of claim 185, wherein the formula for calculating additional parameters, being discrete time volatility, correlation and covariance, for calibration with the model comprise:

$$\sigma_B = \sqrt{\ln\left(\frac{V_T^2\left[1 - N(d_1)\right]e^{\sigma_V^2 T} + X^2 N(d_2)}{B_T^2}\right)\Bigg/ T}$$

$$\sigma_S = \sqrt{\ln\left(\frac{V_T^2 N(d_1)e^{\sigma_V^2 T} - 2V_T X N(d_1) + X^2 N(d_2)}{S_T^2}\right)\Bigg/ T}$$

$$\rho_{BS} = \frac{X - B_T}{B_T\sqrt{\left(e^{\sigma_V^2 T} - 1\right)\left(e^{\sigma_S^2 T} - 1\right)}}$$

$$\rho_{VB} = \frac{V_T\left[1 - N(d_1)\right]e^{\sigma_V^2 T} + XN(d_1) - B_T}{B_T\sqrt{\left(e^{\sigma_V^2 T} - 1\right)\left(e^{\sigma_V^2 T} - 1\right)}}$$

$$\rho_{VS} = \frac{V_T N(d_1)e^{\sigma_V^2 T} - XN(d_1) - S_T}{S_T\sqrt{\left(e^{\sigma_V^2 T} - 1\right)\left(e^{\sigma_V^2 T} - 1\right)}}$$

$$\sigma_{BS} = \rho_{BS}\sigma_B\sigma_S$$

$$\sigma_{VB} = \rho_{VB}\sigma_V\sigma_B$$

$$\sigma_{VS} = \rho_{VS}\sigma_V\sigma_S$$

where the additional term is:

$$d_1 = d_1 + \sigma_V\sqrt{T}$$

No Patentable Weight is given to non-functional descriptive material. There are no functional steps provided, only equations. See MPEP 2106.01 II.

Regarding claims 218, 272 and 326:
(claim 218) The computer implemented method of claim 209, wherein the formula for calculating additional parameters, being discrete time volatility, correlation and covariance, for calibration with the model comprise:

$$\sigma_B = \sqrt{\ln\left(\frac{V_T^2\left[1-N(d_1)\right]e^{\sigma_B^2 T} + X^2 N(d_2)}{B_T^2}\right)\Big/T}$$

$$\sigma_S = \sqrt{\ln\left(\frac{V_T^2 N(d_1)e^{\sigma_S^2 T} - 2V_T XN(d_1) + X^2 N(d_2)}{S_T^2}\right)\Big/T}$$

$$\rho_{BS} = \frac{X - B_T}{B_T\sqrt{\left(e^{\sigma_B^2 T}-1\right)\left(e^{\sigma_S^2 T}-1\right)}}$$

$$\rho_{VB} = \frac{V_T\left[1-N(d_1)\right]e^{\sigma_V^2 T} + XN(d_1) - B_T}{B_T\sqrt{\left(e^{\sigma_V^2 T}-1\right)\left(e^{\sigma_B^2 T}-1\right)}}$$

$$\rho_{VS} = \frac{V_T N(d_1)e^{\sigma_S^2 T} - XN(d_1) - S_T}{S_T\sqrt{\left(e^{\sigma_V^2 T}-1\right)\left(e^{\sigma_S^2 T}-1\right)}}$$

$$\sigma_{BS} = \rho_{BS}\sigma_B\sigma_S$$

$$\sigma_{VB} = \rho_{VB}\sigma_V\sigma_B$$

$$\sigma_{VS} = \rho_{VS}\sigma_V\sigma_S$$

where the additional term is:

$$d_3 = d_1 + \sigma_V\sqrt{T}$$

No Patentable Weight is given to non-functional descriptive material. There are no functional steps provided, only equations. See MPEP 2106.01 II.

Regarding claims 331, 336, and 341:
(claim 331) A computer-readable medium having stored thereon the output from the process of claim 209.

Sandretto teaches:

Fig. 1A, ref. 8.

Regarding claims 327, 332, and 337:
(claim 327) A computer-readable medium having stored thereon the output from the process of claim 165.
Sandretto teaches:
Fig. 1A, ref. 8.

Regarding claims 342, 347, and 352:
(claim 342) A computer-readable medium having stored thereon an order to buy or sell securities, or otherwise enter into a financial contract, based at least in part on output from the process of claim 165.
Sandretto teaches:
Fig. 1A, ref. 8.

Regarding claims 346, 351, and 356:
(claim 346) A computer-readable medium having stored thereon an order to buy or sell securities, or otherwise enter into a financial contract, based at least in part on output from the process of claim 209.
Sandretto teaches:
Fig. 1A, ref. 8.

Regarding claims 357, 362, and 367:
(claim 357) A computer-readable medium having stored thereon a recommendation to buy or sell securities, or otherwise enter into a financial contract, based at least in part on output from the process of claim 165.
Sandretto teaches:
Fig. 1A, ref. 8.

Regarding claims 361, 366, and 371:
(claim 361) A computer-readable medium having stored thereon a recommendation to buy or sell securities, or otherwise enter into a financial contract, based at least in part on output from the process of claim 209.
Sandretto teaches:
Fig. 1A, ref. 8.

83. Claims 169-170, 223-224, and 277-278 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references in section (82) above in further view of Pub. No. 2005/0080704 to Erlach et al.

Regarding claims 169, 223 and 277:

(claim 169) The computer implemented method of claim 165, wherein the rate of return for a security (or securities) issued by, or referenced to, a firm is analysed utilising an estimate of the expected default loss of another, debt-type security (security j) issued by, or referenced to, the firm, the method further comprising the steps of:
determining the rate of return on security j (rj) by reference to the promised yield on said security (yj) and the expected default loss (EDLj) on said security where:
rj= yj – EDLj

See Default below

calculating the excess return for said security j as equal to rj - r, where r is the risk free rate of return;

See Default below

calculating the exposure of each security to each priced risk factor (m);

Sandretto teaches:

"By regressing returns for an index of simulated corporate stock returns against the index of simulated U.S. Treasury security returns, it is possible to estimate a corporate stock risk premium. This may be a particular advantage since current methods of comparing the price of corporate stocks with the price of U.S. Treasury securities probably rely more on judgement and on statistics than on formal risk-return analysis;" (col. 12, lines 33-40)

calculating a price per unit of risk (λm) for each priced risk factor (m) in which each λm is the same for two or more securities issued by, or referenced to, the firm and such that the product of the risk exposures for security j and the prices per unit of risk equals the excess return for security j, and similarly for any other security for which an estimate of the excess return is available;

Sandretto teaches:

"(3) equate the risk premium for one or more asset classes, such as U.S. stocks or U.K. Treasury securities (or risk factors in the APT) with the risk premium implied by: the relation between that asset class and the risk premium from an asset class believed to be efficiently priced, such as U.S. Treasury securities." (col. 12, lines 18-24) In this manner, the risk factor is the same.

designating that one of the priced risk factors relates to the volatility of the rate of return on securities estimated over a discrete time period and is specific to securities issued by, or referenced to, the firm;

Sandretto teaches:

"Using the statistical process of ordinary least squares regression, regress the returns for GM stock against the returns for the market index. The resulting regression yields a risk measure for General Motors stock. That risk measure, the slope of the regression line, is usually called beta (.beta.).

The estimated .beta." (col. 5, lines 9-14) Beta is a risk measure of the volatility of the return.

calculating the excess rate of return for all of the other securities being analysed, other than j, based at least partly on their exposure to each priced risk factor and the price per unit of risk for each risk factor;

Sandretto teaches:

"According to another embodiment, the Sharpe-Lintner model may be implemented using only two simulated returns for each bond, or only one simulated return for each bond based upon the assumption that the origin is a second point, i.e., a 0.0% excess return for an asset and 0.0% excess return for the index (0.0% in excess of Rf). In either of these simplified methods simple division can replace linear regression as a technique to determine a bond's risk measure." (col. 20, line 67 and col. 21, lines 1-8)

fitting the model; and

Sandretto teaches:

"More specifically, this invention relates to an iterative process to estimate a discount rate for each of two or more assets. This invention relates to similar iterative processes to estimate other variables or coefficients that are useful in estimating an asset's risk or NPV." (col. 3, lines 23-29) Therefore an iterative process solves (fits) the variables to the equations.

providing as output to a user parameters of interest from the fitted model.

Sandretto teaches:

"FIG. 3 is a schematic drawing of how different estimates for economic variables are used to estimate projected cash flows for each asset, how those cash flows are used to determine NPVs for each asset and for an index, how NPVs are used to determine simulated returns, how simulated returns are used to determine output risk measures, and how the iterative process is used to re-estimate NPVs and asset values;" (col. 13, lines 1-8)

Default

The combined references teach risk premium. They do not teach default.

Erlach et al. teaches

"Just as a junk bond yield includes a default rate premium in addition to a term-adjusted risk-free rate; a required stock yield must incorporate a default risk premium greater than the debt grade for the same risk class since equity comes after debt in recovery." [0109]

"Just as a junk bond yield includes a default rate premium in addition to a term-adjusted risk-free rate; a required stock yield must incorporate a

default risk premium greater than the debt grade for the same risk class since equity comes after debt in recovery." [0109]

It would have been obvious to one of ordinary skill in the art at the time of invention to include with asset analyses of the combined references default analyses as taught by Erlach et al. since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

Regarding claims 170, 224 and 278:
(claim 170) The computer implemented method of claim 169, wherein the only priced risk factor comprises the volatility of returns and is implemented by:
designating the relationship between the firm specific price of volatility risk (λσ), the rate of return for j (rj), the volatility of returns for j(σj) and the risk free rate of return (0 as:

λσ = (rj—r)/σj

Sandretto teaches:
"For example, the risk-free rate may be entered as 3.0% annually, with an expected standard deviation over a 30-day period of 0.4%." (col. 19, lines 26-29)

designating the rate of return (rk) on another class, or classes, of security (k) issued by, or referenced to, the firm as:

rk =r + λσ

"Assuming that the estimated inflation rates and the estimated returns to the market are correct, the process has determined a value for each asset and the riskiness .beta. for each asset." (col. 11, lines 51-55)

designating, where security class or classes k are debt-type securities, the default loss on said securities by combining the promised yield on said securities (yk) and their rate of return (rk) as follows:

EDL = yk – rk

See Default below.

fitting the model; and

Sandretto teaches:
"FIG. 3 is a schematic drawing of how different estimates for economic variables are used to estimate projected cash flows for each asset, how those cash flows are used to determine NPVs for each asset and for an

index, how NPVs are used to determine simulated returns, how simulated returns are used to determine output risk measures, and how the iterative process is used to re-estimate NPVs and asset values;" (col. 13, lines 1-8)

providing as output to a user parameters of interest from the fitted model.

"FIG. 3 is a schematic drawing of how different estimates for economic variables are used to estimate projected cash flows for each asset, how those cash flows are used to determine NPVs for each asset and for an index, how NPVs are used to determine simulated returns, how simulated returns are used to determine output risk measures, and how the iterative process is used to re-estimate NPVs and asset values;" (col. 13, lines 1-8)

Default
The combined references teach risk and volatility. They do not teach default.

Erlach et al. teaches
"Note that at-risk bonds cannot yield more than treasuries in real, after-tax terms in the aggregate, and after defaults net of recoveries and related costs, else this return too would impossibly decouple from real GDP." [0137]

It would have been obvious to one of ordinary skill in the art at the time of invention to include with risk and volatility of the combined references default analyses as taught by Erlach et al. since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

84. Claims 183-184, 204, 206, 237-238, 258, 260, 291-292, 312, 314 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references in section (82) above in further view of Pub. No. 2005/0033678 to Huneault et al.

Regarding claims 183, 237 and 291:
(claim 183) The computer implemented method of claim 165, wherein one or more of the securities is an option, the method further comprising the steps of:
specifying the real world distribution process that the returns on the underlying asset are expected to follow;

Sandretto teaches:

"(6) Estimate different .beta.s for each additional set of economic conditions (because risk measures are different under different economic conditions, this may sometimes be desirable). Thus, a different discount rate for each set of economic conditions would be used to determine discounted cash flows under each set of different economic conditions." (col. 12, lines 49-55) Economic conditions reflect a real world process.

calculating the expected real world probability of the option being exercised;
See Option below.

calculating the expected mean, standard deviation and other higher moments of interest of the option, at the time the option is expected to be exercised;

"In Step 560 the user enters into computer system 1 the current estimate for each economic variable (i.e., the mean), the statistical distribution (assuming that the revised sets of economic variables are to be randomly generated using statistical methods), and any correlations between variables." (col. 25, lines 63-67 and col. 26, line 1)

using the aforesaid parameters to calculate the expected real world pay off from the option;
See Option below.

discounting back to present value (as at the chosen evaluation date) the pay off from the option using a risk adjusted discount rate, where said risk adjusted discount rate includes a risk premium for the expected standard deviation (measured over discrete time) of the expected option pay off, for such other higher moments of interest to the user and adjustments for any other factors specified by a user, such that the price per unit of risk, for each risk factor, is equated for two or more assets or securities selected from the options being evaluated, the underlying asset and any other securities of interest referenced thereto; and
"It is highly preferable to discount estimated cash flows rather than to discount estimated earnings. The present invention may, however, be applied to either method." (col. 2, lines 62-65)

providing as output to a user parameters of interest from the fitted model.
"FIG. 3 is a schematic drawing of how different estimates for economic variables are used to estimate projected cash flows for each asset, how those cash flows are used to determine NPVs for each asset and for an index, how NPVs are used to determine simulated returns, how simulated returns are used to determine output risk measures, and how the iterative process is used to re-estimate NPVs and asset values;" (col. 13, lines 1-8)

The combined references teach assets, such as bonds, securities, and derivatives. They do not teach probability of an options.

Option
Huneault teaches:
"The technique of topographically mapping insurance then corresponds to a powerful and general technique for extending complete sets of solutions for option valuation to other families of probability densities." [0189]

It would have been obvious to one of ordinary skill in the art at the time of invention to include with asset analyses of the combined references analysis of options as taught by Huneault since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

Regarding claims 184, 238 and 292:
(claim 184) The computer implemented method of claim 183, further comprising the step of using the estimated values for the rate of return, standard deviation, other higher moments of interest and any other factors specified by a user for the asset as input to price or value other options contingent on the same or similar assets.

Sandretto teaches:
"If in Step 162 the measure of the difference between the value of each of the bonds and their market value is less than a predetermined amount, the process continues at Step 170 where the risk measure determined by the process may be printed or otherwise displayed to the user, with other useful information including asset prices, estimated inflation, estimated risk premiums, estimated standard deviations for each bond (which may be useful for evaluating options) and, if desired, over and under valued assets." (col. 18, lines 41-49)

Regarding claims 204, 258, and 312:
(claim 204) The computer implemented method of claim 183, wherein the real world distribution process that the returns on the firm (or underlying asset) are expected to follow is modelled as a specified statistical distribution, wherein the mean, standard deviation and other higher moments of interest of the portions of that distribution relevant to a security are estimated using closed-form type formula solutions or numerical approximations appropriate for the specified statistical distribution process.

No Patentable Weight is given to intended use language. Use of "are expected to follow…" is intended use since the returns may never follow the specified distribution.

Regarding claims 206, 260, and 314:

(claim 206)The computer implemented method of claim 204, wherein the real world statistical distribution process that the returns on the firm (or underlying asset) are expected to follow is the normal distribution.

No Patentable Weight is given to intended use language. Use of "are expected to follow..." is intended use since the returns may never follow a normal distribution.

85. Claims 186, 205, 207, 208, 240, 259, 261-262, 294, 313, and 315-316 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references in section (82) above in further view of Pub. No. US 2005/0021452 to Lipton et al.

Regarding claims 186, 240 and 294:

(claim 186) The computer implemented method of claim 185, further comprising the steps of:

specifying the real world distribution process that the returns on the firm's assets are expected to follow;

Sandretto teaches:

"In Step 560 the user enters into computer system 1 the current estimate for each economic variable (i.e., the mean), the statistical distribution (assuming that the revised sets of economic variables are to be randomly generated using statistical methods), and any correlations between variables." (col. 25, lines 63-67 and col. 26, line 1)

specifying a default point representing the value of the firm's assets at which the firm is expected to default;

See Default below.

calculating the expected real world probability of the default point being met;

See Default below.

calculating the expected mean, standard deviation and other higher moments of interest of the securities being analysed, having regard to the distribution process modelled for the firm's assets and the default point, at the time horizon of interest; using the aforesaid parameters to calculate the expected real world pay off of the securities being analysed, at the time horizon of interest;

Sandretto teaches:

"In Step 560 the user enters into computer system 1 the current estimate for each economic variable (i.e., the mean), the statistical distribution (assuming that the revised sets of economic variables are to be randomly generated using statistical methods), and any correlations between variables." (col. 25, lines 63-67 and col. 26, line 1)

discounting back to present value (as at the chosen evaluation date) the expected pay offs of each security being analysed using a risk adjusted discount rate, where said risk adjusted discount rate includes a risk premium for the expected standard deviation of the expected pay off from the security, for such other higher moments of interest to the user and adjustments for any other factors specified by a user, such that the price per unit of risk, for each such risk factor, is equated for two or more securities issued by, or referenced to, the firm;

> **"Since, at least initially, the discount rate is unknown, the fourth step is to determine an initial estimate of each asset's risk measure (.beta.). The fifth step is to determine each asset's discount rate based upon the initial estimate of that asset's risk measure .beta., the risk-free rate and the market risk premium." (col. 10, lines 50-55)**

fitting the model; and

> **"More specifically, this invention relates to an iterative process to estimate a discount rate for each of two or more assets. This invention relates to similar iterative processes to estimate other variables or coefficients that are useful in estimating an asset's risk or NPV." (col. 3, lines 23-29) Therefore an iterative process solves (fits) the variables to the equations.**

providing as output to a user parameters of interest from the fitted model.

> **"FIG. 3 is a schematic drawing of how different estimates for economic variables are used to estimate projected cash flows for each asset, how those cash flows are used to determine NPVs for each asset and for an index, how NPVs are used to determine simulated returns, how simulated returns are used to determine output risk measures, and how the iterative process is used to re-estimate NPVs and asset values;" (col. 13, lines 1-8)**
>
> **The combined references teach risk for a plurality of assets. They do not teach default.**
>
> **Lipton et al. teaches:**
> **"In the second embodiment, methods and systems are provided for for calculating the financial status of a company, the method comprising the steps of: calculating the value over time of a company in accordance with Zhou's model; determining that the company defaults if at a sequence of discrete observational times the value of the company falls below a corresponding barrier level, the barrier levels selected to represent different debt amounts which come due at corresponding times; and calculating the transitional probability density function for the value of the company conditional on no default occurring between an initial time and an observational time using a probability vector P." [0052]**

It would have been obvious to one of ordinary skill in the art at the time of invention to include with asset analyses of the combined references default analyses as taught by Lipton et al since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

Regarding claims 205, 259 and 313:
(claim 205) The computer implemented method of claim 186, wherein the real world distribution process that the returns on the firm (or underlying asset) are expected to follow is modelled as a specified statistical distribution, wherein the mean, standard deviation and other higher moments of interest of the portions of that distribution relevant to a security are estimated using closed-form type formula solutions or numerical approximations appropriate for the specified statistical distribution process.

Sandretto teaches:
"In Step 560 the user enters into computer system 1 the current estimate for each economic variable (i.e., the mean), the statistical distribution (assuming that the revised sets of economic variables are to be randomly generated using statistical methods), and any correlations between variables." (col. 25, lines 63-67, and col. 26, line 1)

Regarding claims 207, 261 and 315:
(claim 207) The computer implemented method of claim 205, wherein the real world statistical distribution process that the returns on the firm (or underlying asset) are expected to follow is the normal distribution.

No Patentable Weight is given to intended use language. Use of "are expected to follow..." is intended use since the returns may never follow a normal distribution.

Regarding claims 208, 262 and 316:
(claim 208) The computer implemented method of claim 207, wherein the firm has, or is treated as having, only a single class of zero coupon debt on issue and the model is fitted such that:

$$\frac{\ln\left(\left\{V_0 e^{r_v T}\left[1-N(d_1)\right]+B_0 e^{-rT} N(d_2)\right\}\Big/ B_0\right)\Big/ T - r}{\sigma_B} = \frac{\ln\left(\left\{V_0 e^{r_v T} N(d_1)-B_0 e^{-yT} N(d_2)\right\}\Big/ S_0\right)\Big/ T - r}{\sigma_S}$$

where:

S_0 is the value of the equity of the firm at time n

V_0 is the value of the firm's assets at time n and the value of the firm's assets is the sum of the values of the firm's debt (B) and equity (S)

X is the face value of the firm's debt (B), which is assumed to be a single zero-coupon bond, at maturity

T is the user selected time horizon, in years

r_v is the rate of return on the firm's assets, per annum

y is the promised yield on the firm's debt, per annum

$$d_1 = \left(\left[\ln\left(V_0/X\right) + r_v T\right]\Big/\sigma_V\sqrt{T}\right) + (1/2)\left(\sigma_V\sqrt{T}\right)$$

$$d_2 = d_1 - \sigma_V\sqrt{T}$$

$N(.)$ is the cumulative probability of the standard normal distribution with d_1 or d_2 as the upper limit

r is the risk free rate of return, per annum

σ_V is the standard deviation of rates of return on the firm's assets, per annum

σ_B is the standard deviation of rates of return on the firm's debt, per annum

σ_S is the standard deviation of rates of return on the firm's equity, per annum.

No Patentable Weight is given to non-functional descriptive material. There are no functional steps provided, only two equations that equal each other.

86. Claims 190, 192, 244, 246, 298, and 300 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references in section (82) above in further view of Pub. No. US 2005/0187851 to Sant.

Regarding claims: 190, 244, and 298; and claims 192, 246 and 300:
(claim 190) The computer implemented method of claim 187, wherein at least one of the unknown inputs included in one or more additional multi-variate equations comprises or represents the covariance between the returns of a pair of securities issued by, or referenced to, the firm.

(claim 192) The computer implemented method of claim 187, wherein at least one of the unknown inputs included in one or more additional multi-variate equations comprises or represents the covariance between the returns of a security issued by, or referenced to, the firm and the returns of the total firm.

The combined references teach asset analyses. They do not teach covariance.

Sant teaches:

[0444] The last equation represents the Security Market Line (refer to **FIG. 34**). Where, w_j is the weight of stock j in a portfolio and RP_M is the risk premium on the market index portfolio, which defaults to 5% but is user controlled. Portfolio beta (b_P) is also used to compute the diversifiable risk and systematic risk of the portfolio (**3405**).

Diversifiable risk of portfolio=$\sigma_P^2-b_P^2\times\sigma_M^2$

Portfolio variance=$\sigma_P^2=\Sigma\Sigma\ w_i\ w_j\ Cov_{ij}$

Covariance of a pair of stocks=$Cov_{ij}=(1/n-1)\Sigma(R_{it}-R_i)(R_{jt}-R_j)$

Systematic risk of portfolio=$b_P^2\times\sigma_M^2$

Market index variance $\sigma_M^2=(1/n-1)\Sigma(R_{Mt}-R_M)^2$

$R_M=(1/n)\Sigma R_{Mt}$

It would have been obvious to one of ordinary skill in the art at the time of invention to include with asset analyses of the combined references covariance as taught by Sant since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

87. Claims 193-194, 247-248, and 301-302 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references in section (82) above in further view of Pub. No. US 2005/0021452 to Lipton et al.

Regarding claims: 193, 247 and 301; and claims 194, 248 and 302:
(claim 193) The computer implemented method of claim 187, wherein at least one of the unknown inputs included in one or more additional multi-variate equations comprises or represents the expected probability of default.
(claim 194) The computer implemented method of claim 187, wherein at least one of the unknown inputs included in one or more additional multi-variate equations comprises or represents the expected loss given default on a debt-type security issued by, or referenced to, the firm.

The combined references teach risk for a plurality of assets. They do not teach default.

Lipton et al. teaches:
"In the second embodiment, methods and systems are provided for for calculating the financial status of a company, the method comprising the steps of: calculating the value over time of a company in accordance with Zhou's model; determining that the company defaults if at a sequence of discrete observational times the value of the company falls below a corresponding barrier level, the barrier levels selected to represent different debt amounts which come due at corresponding times; and calculating the transitional probability density function for the value of the company conditional on no default occurring between an initial time and an observational time using a probability vector P." [0052]

It would have been obvious to one of ordinary skill in the art at the time of invention to include with asset analyses of the combined references default analyses as taught by Lipton et al since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

88. Claims 198, 252, and 306 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references in section (82) above in further view of Pub. No. US 2005/0187851 to Sant.

Regarding claims 198, 252 and 306:
(claim 198) The computer implemented method of claim 185, further comprising the steps of generating one or more parameters from the model and solving the model so that the said parameters equal values specified by a user, where one of the said parameters is the covariance between the returns of a pair of securities issued by, or referenced to, the firm.

The combined references teach asset analyses. They do not teach covariance.

Sant teaches:

[0444] The last equation represents the Security Market Line (refer to **FIG. 34**). Where, w_j is the weight of stock j in a portfolio and RP_M is the risk premium on the market index portfolio, which defaults to 5% but is user controlled. Portfolio beta (b_P) is also used to compute the diversifiable risk and systematic risk of the portfolio (**3405**).

Diversifiable risk of portfolio $=\sigma_P^2-b_P^2\times\sigma_M^2$

Portfolio variance $=\sigma_P^2=\Sigma\Sigma\ w_i\ w_j\ Cov_{ij}$

Covariance of a pair of stocks $=Cov_{ij}=(1/n-1)\Sigma(R_{it}-R_i)(R_{jt}-R_j)$

Systematic risk of portfolio $=b_P^2\times\sigma_M^2$

Market index variance $\sigma_M^2=(1/n-1)\Sigma(R_{Mt}-R_M)^2$

$R_M=(1/n)\Sigma R_{Mt}$

It would have been obvious to one of ordinary skill in the art at the time of invention to include with asset analyses of the combined references covariance as taught by Sant since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

89. Claims 200, 254, and 308 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references in section (82) above in further view of Pub. No. US 2005/0187851 to Sant.

Regarding claims 200, 254, 308:
(claim 200) The computer implemented method of claim 185, further comprising the steps of generating one or more parameters from the model and solving the model so that the said parameters equal values specified by a user, where one of the said parameters is the covariance between the returns of a security issued by, or referenced to, the firm and the returns of the total firm.

The combined references teach asset analyses. They do not teach covariance.

Sant teaches:

[0444] The last equation represents the Security Market Line (refer to **FIG. 34**). Where, w_j is the weight of stock j in a portfolio and RP_M is the risk premium on the market index portfolio, which defaults to 5% but is user controlled. Portfolio beta (b_P) is also used to compute the diversifiable risk and systematic risk of the portfolio (**3405**).

Diversifiable risk of portfolio=$\sigma_P^2-b_P^2\times\sigma_M^2$

Portfolio variance=$\sigma_P^2=\Sigma\Sigma\ w_i\ w_j\ Cov_{ij}$

Covariance of a pair of stocks=$Cov_{ij}=(1/n-1)\Sigma(R_{it}-R_i)(R_{jt}-R_j)$

Systematic risk of portfolio=$b_P^2\times\sigma_M^2$

Market index variance $\sigma_M^2=(1/n-1)\Sigma(R_{Mt}-R_M)^2$

$R_M=(1/n)\Sigma R_{Mt}$

It would have been obvious to one of ordinary skill in the art at the time of invention to include with asset analyses of the combined references covariance as taught by Sant since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of

ordinary skill in the art would have recognized that the results of the combination were predictable.

90. Claims 201, 255, and 309 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references in section (82) above in further view of Pub. No. US 2005/0021452 to Lipton et al.

Regarding claims 201, 255 and 309:
(claim 201) The computer implemented method of claim 185, further comprising the steps of generating one or more parameters from the model and solving the model so that the said parameters equal values specified by a user, where one of the said parameters is the expected probability of default.

The combined references teach risk for a plurality of assets. They do not teach default.

Lipton et al. teaches:
"In the second embodiment, methods and systems are provided for for calculating the financial status of a company, the method comprising the steps of: calculating the value over time of a company in accordance with Zhou's model; determining that the company defaults if at a sequence of discrete observational times the value of the company falls below a corresponding barrier level, the barrier levels selected to represent different debt amounts which come due at corresponding times; and calculating the transitional probability density function for the value of the company conditional on no default occurring between an initial time and an observational time using a probability vector P." [0052]

It would have been obvious to one of ordinary skill in the art at the time of invention to include with asset analyses of the combined references default analyses as taught by Lipton et al since the claimed invention is merely a combination of old elements and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

91. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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US 20030110016 A1	**US-PGPUB**	**Stefek et al.**
US 20030139993 A1	**US-PGPUB**	**Feuerverger**
US 20040103013 A1	**US-PGPUB**	**Jameson**
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US 6546375 B1	**USPAT**	**Pang et al.**
US 7089207 B1	**USPAT**	**Lardy et al.**
US 7315838 B2	**USPAT**	**Gershon**

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH L. BARTLEY whose telephone number is (571)272-5230. The examiner can normally be reached on Monday through Friday, 8:00 - 5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jagdish Patel can be reached on (571) 272-6748. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAGDISH N PATEL/
Primary Examiner, Art Unit 3693